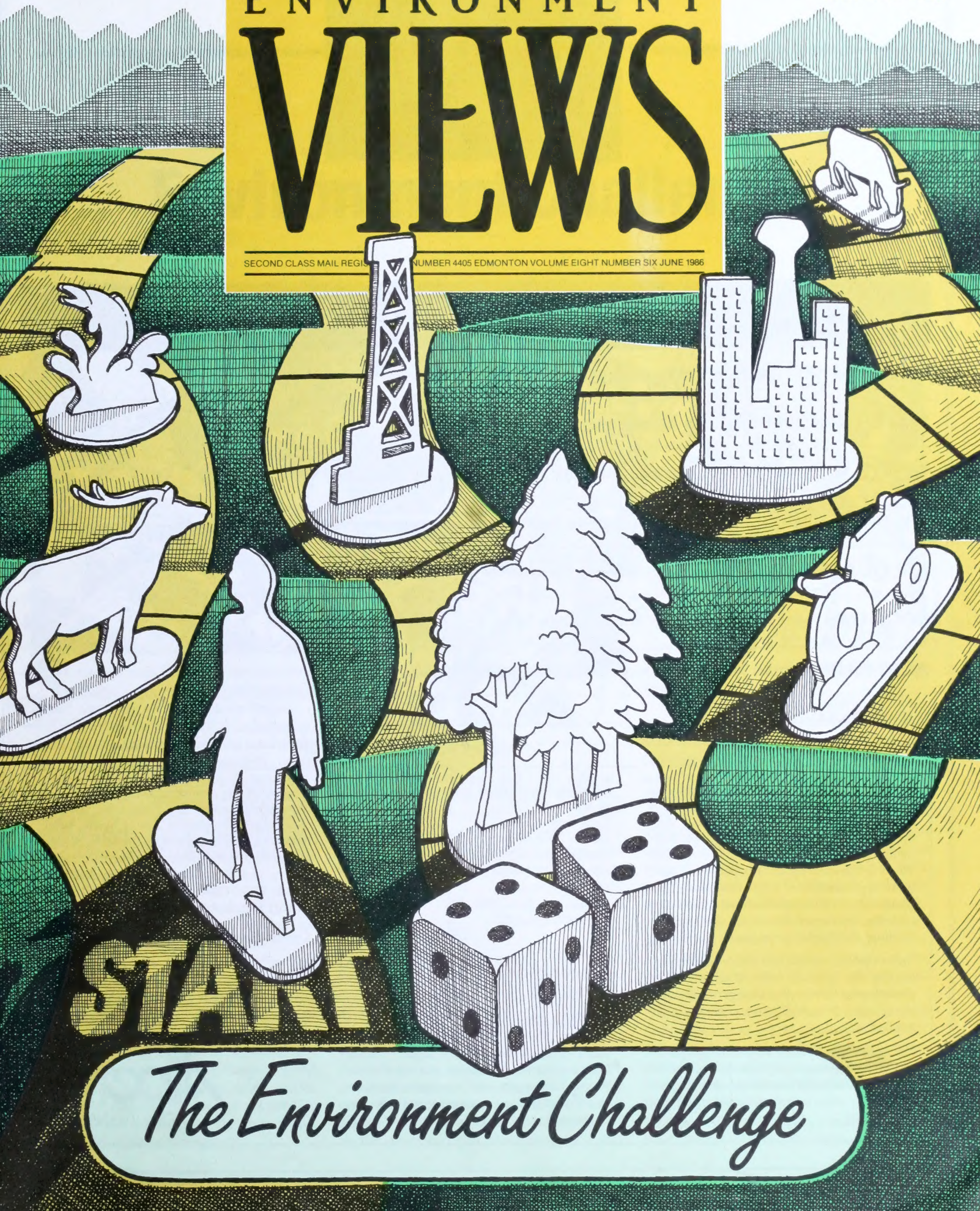
AL-1.478

CANADIANA
MAY 26 1986

ENVIRONMENT VIEWS

SECOND CLASS MAIL REGIS NUMBER 4405 EDMONTON VOLUME EIGHT NUMBER SIX JUNE 1986



The Environment Challenge

ENVIRONMENT
VIEWS

Contents

EDITOR'S NOTEBOOK Taking the Environment Challenge 3

WATER ISSUES How good is Alberta's water? Do we treat it well? 4

WASTE MANAGEMENT The long and happy life of a landfill, and other trashy tales. 10

WILDLIFE Where do wildlife fit into agriculture, forestry, mining, tourism and oil and gas development? 14

AIR QUALITY Put out that cigarette and open the window. 20

SOUR GAS A trip to Sour Gas Alley in search of the facts. 24

ACID RAIN Alberta is Number Three on the acid-formation hit parade. 28

ENVIRONMENT WEEK '86 32

Environment Views is published quarterly by Alberta Environment. Each issue deals with a specific topic from various viewpoints with the aim of increasing awareness of environmental issues among Albertans. *Environment Views* is directed by an independent board with representation from environmental groups, government and industry. The views expressed by the publication are not necessarily those of Alberta Environment.

Subscriptions are free and can be obtained by mailing the enclosed card. When notifying *Environment Views* of a change of address, please quote the subscription number on your mailing label.

Permission to reproduce any part of this publication for commercial purposes should be obtained by writing the address below. Reproduction for other purposes should credit this publication.

Letters to the editor are welcomed, and should be sent to the editor,
Environment Views
Alberta Environment
Communications Branch
12th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta T5K 2J6
Call (403) 427-6267

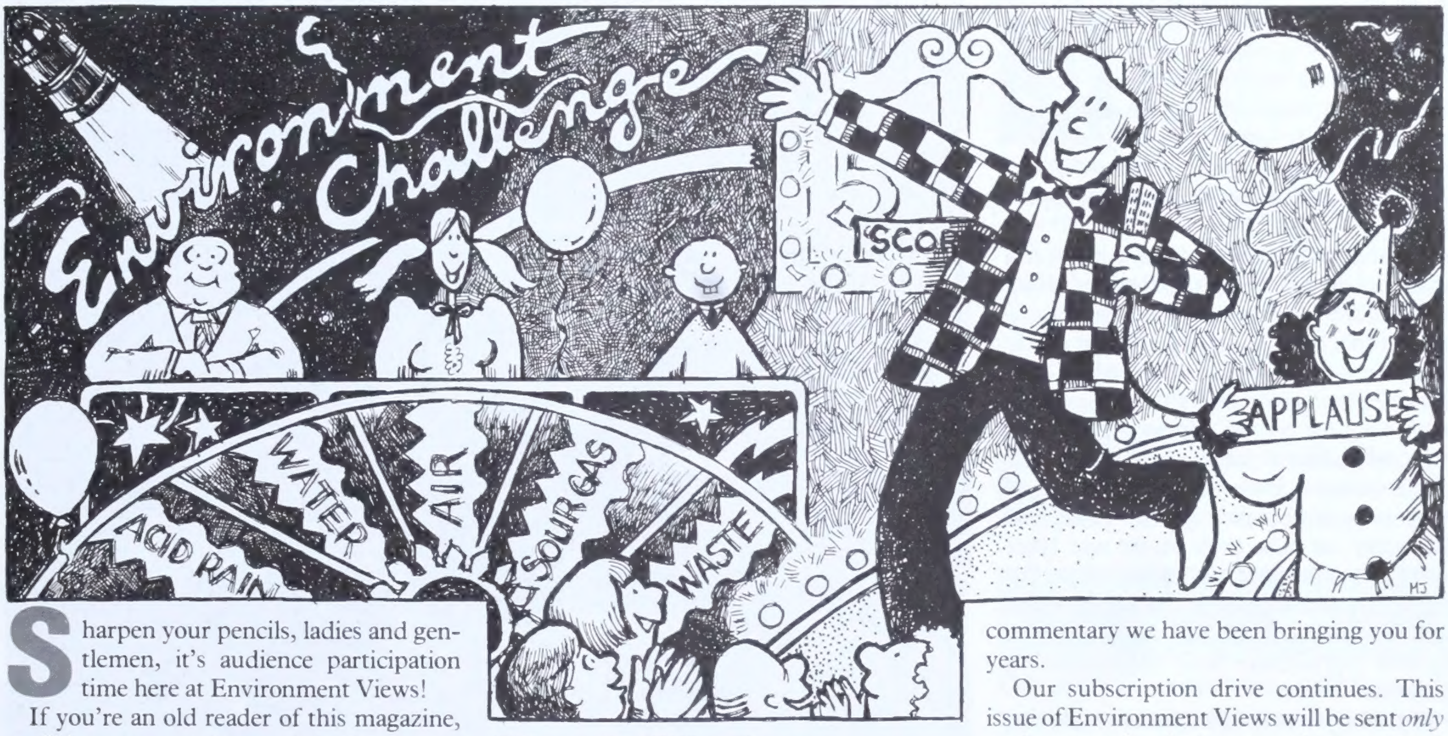
Editor:
Maryhelen Vicars
Researcher:
Lynn Zwicky
Editorial Board:
Norman Elliott, public affairs director, Canadian Petroleum Association, Calgary; Natalia Krawetz, partner in Krawetz and MacDonald Research Management Consultants, Edmonton; David McCoy, environmental scientist, Canterra Energy Ltd., Calgary; Don Nicol, director of the communications branch, Alberta Environment; Ray Rasmussen, Alberta Wilderness Association; David Spink, head of the municipal engineering branch, standards and approvals division, Alberta Environment; and Bob Westbury, president of S.E.E.D.S. (Society, Environment and Energy Development Studies), Edmonton.

Cover Illustration: Warren Clark (G.D.L.)

Alberta
ENVIRONMENT

Editor's Notebook

Taking the Environment Challenge



MARTHA JONES

Sharpen your pencils, ladies and gentlemen, it's audience participation time here at Environment Views!

If you're an old reader of this magazine, you'll know we are always asking hard questions and trying to find the answers, as we cover the difficult issues of environment quality. But this time, the questions and answers are a little more formal. To help celebrate Environment Week '86, we have put together a kind of quiz that we're calling Environment Challenge.

It is divided into five big topics: water, waste, air, sour gas, and acid rain. When we checked our mail files and asked around, we learned these are the most-asked-about environmental topics in Alberta in the '80s. Our writers give you a little introductory review for each topic, and a few words about each question (read carefully, there are important clues there). The Environment Challenge is for fun — some of the questions are tricky, some are easy, but most of them are designed to make you stop and think. After you've made your choices, the answer section for each topic will tell you why the answer you checked was right or wrong.

How It Works:

Read each introduction, and mark your answers with an X or a checkmark. When you have finished *each section,* turn the page for the answers. When you have taken all five sections of the Environment Challenge, add up your total points and turn to page 31 to see how you did.

Notebook:

Long-time readers will notice that our cover looks different. This is the first step of a new look for the magazine. Emily Dehaan-Clark of our design firm, GDL, has redesigned Environment Views for us and we think you'll like it. We're beginning with our new cover this issue, and we'll be using the new design throughout the magazine by next issue. But don't worry, loyal readers, the look is new but the content of the magazine will be the same in-depth, thoughtful facts and commentary we have been bringing you for years.

Our subscription drive continues. This issue of Environment Views will be sent *only* to those people who have sent in the address cards included in the last three issues. Readers who had not sent in their cards by the time this was ready for mailing have been struck from the list. This move will eliminate duplicate mailings or mailings to outdated addresses, but it will also mean that some of our old readers who forgot to send in their cards will miss out. We hope to get those people back on the list eventually, and maybe you can help. Pass this issue around where you work or study, and encourage any of your friends who share your interest in the environment to send in their subscription cards. Subscriptions, as always, are free.

Because of our smaller mailing list, we will have extra copies of this and future issues for distribution. If you can help us build up our readership by taking copies to meetings or conferences, please call 427-6267 or write to the address opposite.

Maryhelen Vicars, a former journalist, is the freelance editor of Environment Views.

by Gail Gravelines

Water Issues

Water. We drink it. Wash with it. Play in it. Grow crops with it and use it to flush away our household and industrial wastes. We dam rivers to harness water's power to generate electricity and use the planet's waterways as our most inexpensive source of transportation.

Water is vital to our existence, but it is a resource strained by competing uses. How we use water, and how we manage it has a direct impact on the quality of water that is available to us. Yet how many of us consider the many issues in water management when we turn on the tap to quench our thirst, or to fill the tub for a relaxing soak?

For instance, have you ever thought of water as manufactured goods? It is. The raw water we take from rivers and lakes undergoes treatment before we use it. It's chemically pre-treated and chlorinated to control bacteria. Alum or lime is added to remove particulate and color-causing materials.

And after we're finished with it, our waste water is treated again before it's spilled back into our rivers and lakes. But because most of us consider water a free and bountiful resource we don't practice many in-home conservation methods (which can be as simple as repairing leaking toilets and taps, to taking showers rather than baths). Such measures could cut down on the amount of water needing treatment.

One way of encouraging householders to conserve more water is to meter the water use of each household and to charge accordingly, says Garry Lamb, City of Calgary water rates analyst. His is one of the growing number of voices calling for universal metering in Calgary to both encourage conservation and to provide accurate data about exactly how much water is being used and where it is going.

Another group that does appreciate the availability of water is the farmers and ranchers of southern Alberta. Faced with frequent periods of drought, these producers rely on irrigation to keep their operations afloat.

SUE BRUN

Clean water is essential, but often taken for granted.

But Dixon Thompson, a professor in the faculty of environmental design of the University of Calgary, calls for more stringent conservation methods. He says irrigation water users should be metered and they should pay for the amount of water they use. Users could treat the charge as a cost of doing business and the metering would provide more accurate data on how much water is used and where it's used.

Still, there isn't enough water in southern Alberta to meet all the potential irrigation demands. "We're at the crisis stage. There's just not enough cheap water available," he says. He advocates metering of individual irrigation water users, a pay-for-what-you-use scheme to promote conservation and an equitable distribution of water.

"In a crisis we need to manage our resource better. Pricing is one mechanism to address this issue. After all, why should some people get this valuable resource relatively cheaply while a neighbor not in the irrigation district suffers the effects of a drought?"

Water treatment, treatment of waste water, bacteria control in water, irrigation, dams, and water conservation — they're issues that affect our lives every day. How much do you know about them?

QUESTIONS

How good is Alberta's water?

"It's one of the best in the world," is Joe Milos' confident reply. As section head of field services in the pollution control unit of Alberta Environment's municipal engineering branch, Milos acknowledges that we sometimes grumble about the seasonal taste and odor of some of our drinking water.

"People's expectations are very high and we take for granted that we can take water out of a river and that it should be tasteless and odorless simply as a matter of course. That's not always possible," says Milos, who says he rates Alberta's water quality as first-rate during most of the year. He says we Albertans are lucky. We don't have much industrialization. We have a relatively small population. And our waters consequently don't experience a lot of pollution.

Still, there are some concerns about the quality of our drinking water, particularly in Edmonton and in some of the smaller communities downstream of Calgary.

Last fall, Dr. Steve Hrudey, a specialist in water assessment, treatment and waste management in the civil engineering department of the University of Alberta, launched a study into the quality of Edmonton's drinking water. The study was prompted by a general consumer concern about the offensive taste and odor that spills out of our taps each spring. His report — expected this fall — will offer an independent review of water quality issues facing Edmonton and will look at every aspect of water quality including treatment, the quality of raw water, and the quality of the city's water treatment plants.

ALBERTA ENVIRONMENT

Kananaskis Falls Dam on the Bow River.

Milos says communities downstream of Calgary also grumble about the quality of their water, pointing an accusing finger at Calgary's effluent. But Milos says it's the bare-minimum method of water treatment employed by those towns that is the problem. Unlike their urban counterparts whose water is chemically pre-treated, filtered and chlorinated, those smaller centres operate marginal treatment systems that just filter and chlorinate their drinking waters.

Question #1:
The used water we flush back into our rivers and lakes is called effluent. Which of the following is the largest source of effluent that goes into Alberta's lakes and rivers?

☐ (a) food processing industry
☐ (b) oil and gas industry
☐ (c) municipalities

Question #2:
Pathogens are disease-producing organisms (giardia, which causes the water-borne disease also known as beaver fever, is one such organism). Is ☐ (a) warm water or ☐ (b) cold water a better haven for pathogens?

Water Management

Picture this: You wake up in the morning, stumble into the bathroom and turn on the tap to splash your face with cold water. You turn the tap, but there's no water, not a drop.

For most of us it's an unlikely scenario. We take our plentiful supply of water as much for granted as we do the air we breathe. But for the farmers and ranchers operating in the southern two-thirds of the province, the tap often runs dry. Mother Nature did give Alberta water. But she placed the vast majority of it in the northern third of Alberta.

The answer so far? Irrigation: networks of canals diverting water to fields that would be unable to produce what they now do without the aid of this artificial water flow. But irrigation means damming natural river flows, changing aquatic environments and affecting recreation resources both upstream and downstream form the dams.

Water management aims to meet the challenge of striking the fine balance between supplying water to those who need it, while managing a resource that is all too often taken for granted.

Question #3:
Alberta's water is the focus of a variety of competing users. Most users take the water out of rivers and lakes, use it, and return it to the same rivers and lakes. Some water consumers, however, don't return as much water as they use. Which of the following users consumes the most water in Alberta?

☐ (a) agriculture
☐ (b) municipalities
☐ (c) industries

Question #4:
Dams affect water quality.

☐ (a) true
☐ (b) false

Water Conservation

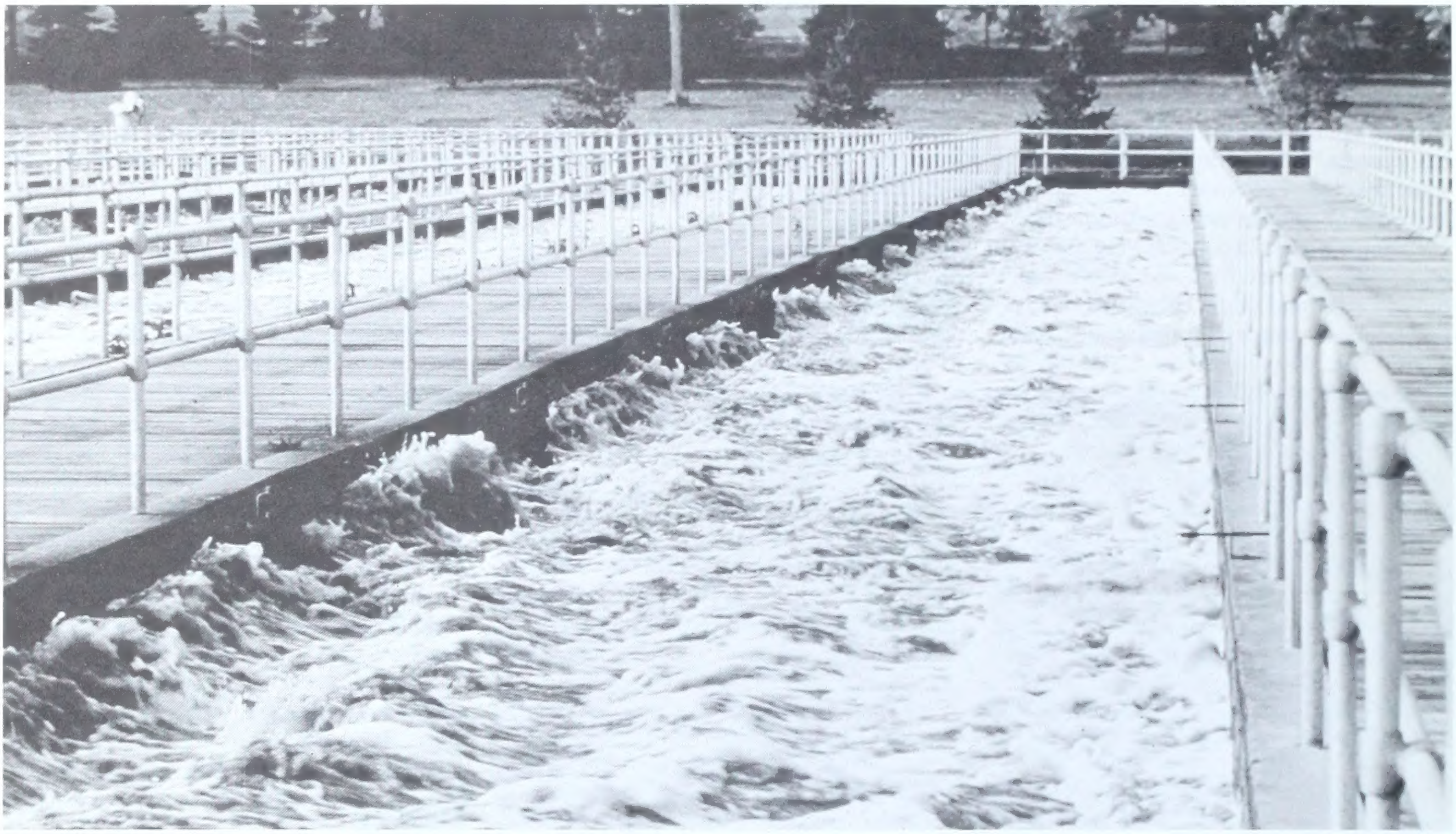
One of the keys to reducing effluent and to minimizing water pollution is to conserve water.

Water conservation is something everyone could do. Simple strategies include turning off the tap while you clean your pearly whites, rather than letting the water flow while you brush, keeping a jug of cold drinking water in the fridge rather than letting the water run cold every time and taking a shower rather than filling the tub.

Question #5:
Water metering, which allows users to be billed for what they actually use instead of being assessed a flat rate, is sometimes recommended as a way to promote water conservation. In Calgary, both metered and unmetered households exist. What is the estimated average difference in their water use?

☐ (a) none
☐ (b) about 10 per cent
☐ (c) about 20 per cent
☐ (d) about 30 per cent

ANSWERS


CITY OF EDMONTON

Aeration tanks of the secondary treatment process at Edmonton's Gold Bar Waste Water Treatment Plant.

Answers #1: (c) Municipalities are the greatest producers of effluent in Alberta.

Edmonton alone creates more effluent each year than all of Alberta's industries combined. Ken Elstone, Edmonton's superintendent of waste water treatment, reports the capital city treats 12,000 million litres of effluent annually.

Why do municipalities create so much effluent? It's a factor of the number of people living in a municipality and how the water is used, says Asoke Weerafinghe, regional engineer with the municipal engineering branch of Alberta Environment.

He says water use is increasing, and with it, effluent production. Another reason why municipalities lead effluent production in Alberta is the province's low level of industrial activity.

Answer #2: (b) Cold water is a better haven for pathogens.

Warm water encourages the growth of flora and fauna that can break down pathogens while cold water tends to preserve the pathogens and extend their life. Dr. Dan Smith, University of Alberta professor of civil engineering in the field of environmental engineering says it's our treatment of the water supply that saves us from the majority of the disease-causing bacteria and viruses in the water supply.

FRED KATZ

Asoke Weerafinghe

"In designing water treatment facilities you must consider the lows and highs of temperatures, the types of chemicals used and the reaction kinetics of chemicals on micro-organisms," says Smith. But chlorine — the disinfectant most commonly used — is more effective on bacteria than viruses.

There is one pesky pathogen that continues to pose problems — giardia, or "beaver fever". Dr. Peter Wallis, a researcher with the University of Calgary's Kananaskis Research Centre, has been examining ways of controlling giardia for the past three years. The problem? It's a pathogen resistant to chlorine, too small to filter out, and it is a parasite living in both people and animals which goes into the water at any point in the system.

Wallis says the best method of giardia prevention is good hygiene — washing your hands after going to the bathroom, after changing baby's diaper, or cleaning up after your pet. Evidence shows that giardia is more likely to be caught from oral-fecal contact than from water.

Answer #3: (a) Agriculture is the largest water consumer in the province.

But work is underway to en-

ALBERTA ENVIRONMENT

United Irrigation District weir on the Belly River.

sure that the thousands of cubic metres that flow through Alberta' irrigation systems are used more efficiently and effectively. Jay Purnell, head of project planning of the resource planning branch of Alberta Agriculture in Lethbridge, reports that a two-pronged irrigation system rehabilitation program is currently underway. The goal? To reduce the loss of irrigation water through seepage and to ultimately conserve water.

FRED KATZ

Good water treatment protects us from most disease-causing bacteria and viruses.

Plastic liners — designed to reclaim seepage water — are currently being installed at many phases of the irrigation system. Purnell says flow metering is also used to measure the elevaton of the water to show how much water is in the system and where it is going.

Purnell says most irrigation users are now thinking about conservation. Alberta Agriculture is working to teach farmers to apply the right amounts of water at the right time (according to crop and soil conditions) in order to "maximize the returns on irrigation."

Answer #4: (a) true

Dams do affect water quality, but Alberta Environment environmental assessment biologist Leigh Noton says on average, the effect is positive.

Because suspended silt is left behind in the reservoir, Noton says water that leaves a dam tends to be clearer than that flowing upstream. The release of dam water also augments downstream flows, a plus during such low flow periods as winter, when water

Your Role in Cleaner Water

For most of us city-dwellers, effective sewage disposal is taken for granted. It may be surprising, therefore, to learn that our household habits can have a lot to do with how well these systems work.

And of course, effective sewage treatment has a lot to do with the quality of the water in our rivers and lakes — and ultimately, the quality of our drinking water.

The capacity of sewage plants is dependent on two different but related functions: hydraulic and organic loading.

Hydraulic loading refers to the volume of water going to settling tanks; organic loading refers to the amount of organic material entering the system.

Treatment plants are set up to treat a certain concentration of organic material in waste water. If that concentration is altered by the addition of either more water or more organic material, there may be problems.

Hydraulic loading may be a greater problem than organic loading. Most people in this part of the world use and dispose of far more water than necessary. This adds to the volume of household sewage and dilutes it, putting a strain on the system. It is generally easier to treat a lower volume of high-concentration waste than a higher volume of low-concentration waste.

How can you cut down your household's contribution to the sewage load? Here are some suggestions offered by water quality experts:

WARREN CLARK

Don't Waste Water.
Put a water-filled plastic bottle in the toilet tank, to reduce the amount of water used to flush (about 24 litres for a conventional toilet, 14 litres for a water-saving model).

Learn to take "sailor's showers". Turn off the tap while shampooing and soaping — you'll save soap as well as water. A short shower takes far less water than a bath in a full (240 litres or more) tub. Using a water-saving shower head cuts water consumption even further.

Repair leaking toilets and taps. To test if your toilet is leaking, put a few drops of food coloring in the tank. If color appears in the bowl without flushing, there is a leak.

Don't let the taps run needlessly. Clean razor and toothbrush with short bursts of water. Keeping a bottle of water cold in the refrigerator eliminates the need for running the tapwater until it feels cold.

Forget the garburator
Widespread garburator use can increase a system's organic loading by as much as 30 per cent, according to a Colorado study. Instead of food scraps going into the sewer, they should be put in the garbage — or better still, composted for the garden.

Your toilet is not a wastebasket
Such things as paper diapers, dental floss, hair or plastic tampon holders can create havoc in the treatment plant. They should all be tossed in the wastebasket, not the toilet. And resist the temptation to chuck the mouldy leftovers into the toilet — they can go into a plastic bag or container and then out with the rest of the garbage.

Watch the chemistry of your sewage
Many of the hazardous chemicals which make their way to treatment plants do not come from industry. A significant amount comes from household products, from the zinc in shampoo and baby ointment to the lead in paints which are cleaned from brushes then dumped with solvents down the sink.

— Maryhelen Vicars

(adapted from the September, 1983 issue of Environment Views)

released from the dam helps dilute any waste water effluents found downstream.

But mercury levels can rise in reservoir water. Noton says the mercury concentration in certain fish species has risen after new dams have been built in North America.

Barry Taylor, Alberta Wilderness Association water management critic, says the reservoirs of water dams have the potential to alter the life cycles of aquatic life downstream. Dam water stays cooler in the summer and warmer in the winter than free running water, and a release of dam water can alter the thermal regime downstream. Taylor says the sudden release of cold dam water can suddenly change the temperature of the water downstream, causing massive fish kills.

Answer #5: (d) Metered households use about 30 per cent less water than unmetered households.

Garry Lamp, water analyst with the City of Calgary, says metered households use about 2.6 million litres of water a year, while unmetered households use an esti-

HAND OVER YOUR PIGGY BANK! THIS IS WORTH AT LEAST A NICKEL!
JONES
MARTHA JONES

Recreational use of water is important, too.

mated 4.33 million litres. He says the estimate of unmetered water is based on a city water conservation study. But it is only an estimate. That's why he favors universal metering — to encourage people to conserve water and to help planners determine how much water is actually used.

"We know how much water we produce, but we estimate we have a leakage rate in the pipes of 25 to 30 per cent. We have about 3,000 km of pipe in the ground and it's not all in one piece." Lamb says universal household metering was vetoed in a plebiscite in the late 1950s. He hopes that a growing concern with conservation will prompt another plebiscite on the issue before the late 1990s — when Calgary will have to expand its water treatment plant unless the demand for water is cut back.

Gail Gravelines, a former journalist, is an Edmonton freelance writer.

How did you do?
Subtotal
(number of correct answers): ☐

Are you a new reader?

Environment Views will be distributed free at all Environment Week activities throughout the province. If you picked this copy up at one of the locations, or are reading a friend's, welcome. Environment Views covers topics of environmental concern to Albertans, providing facts and a forum for a range of views. If you're interested in Alberta's environment, send in the card and become a subscriber. It's free. If the card is missing, phone or write to us at the address inside the front cover.

by Hazel Sangster

Waste Management

Yech! This water tastes terrible! They should do something about it!
SOLVENT
PAINT

WARREN CLARK

Did you know that each person in Alberta generates about three-quarters of a tonne of garbage for a provincial total of 1.5 million tonnes?

Large cities with bulky daily newspapers contribute larger volumes per capita to the waste stream than smaller communities with weekly newspapers. This volume increase is also affected by the concentration of commercial and industrial outlets and the amount of construction and demolition activity in cities.

The Environment Council of Alberta's report on municipal solid waste authored by Brian Free lists a variety of factors that affect this amount locally. These include population size and age, lifestyle, even the season. The garbage collector's busy time is spring while winter is low season.

Paper products are a major component in the composition of municipal solid waste — about 540,000 - 900,000 tonnes. Other materials such as glass, metal, plastic, textiles and wood each contribute about five per cent or less (by weight) to the waste stream; and yard waste, food waste and "other materials" also make up a sizeable component. Information on local waste composition and generation is continually being compiled to accurately assess recycling or reuse potential.

The management of waste generally consists of four elements: initial storage, collection, transportation and final disposal. As waste management becomes more sophisticated, a fifth element, waste treatment or processing, is gaining importance.

The modern waste management solution must be both economically and environmentally sound. Experts like Bill Flook, chairman of the Environment Council of Alberta's urban advisory committee, emphasize the importance of separating waste at the source.

"Individuals and industry have to be persuaded to co-operate, to make the effort to recycle, reuse and reduce."

Recycling is a growing business in Alberta, but, says Alberta Environment's report, "Recycling in Alberta", only a small portion of potentially recyclable material is being recycled.

Obviously, says Joe Kostler, head of Alberta Environment's waste management branch, government and the public have to confront and deal with the problems of waste and waste management.

The government is currently involved in programs such as the Resource Recovery Grant Program which provides a stimulus to communities to install their own collection facilities. But government funds are limited, Kostler says.

Just finished cleaning. I'll turn on the garburator and be right out.

WARREN CLARK

"The applications have gone from five in 1982-83 to approximately 20 in 85-86. Last year we reached our ceiling."

Individual responsibility is equally important. As John Slupsky, of the waste management branch, says.

"People have to be diligent, observant and interested in protecting their environment."

Recycling

Tom Rogers is section head of assessment and implementation with the waste management branch. He thinks that consumers have to change their attitudes.

"Using things once and throwing them away is like digging holes to fill up with garbage. But it's taken us a number of years to get into the disposable psyche, and it will take us another number of years to change over to recycling."

Rogers is encouraged by the fact that people are becoming more aware of the waste management issue and that due to the recession, industries are becoming more interested in the use of secondary materials.

Recycling occurs at all levels of the economy, from industry to offices, retail stores and industry. The materials may be used in the production of the same product, conversion into another product or energy generation.

A $60,000 program funded by Alberta Environment in co-operation with the Alberta Research Council is operating a waste exchange bulletin linking waste generators and users.

Question #1:
Which of the following household products are regularly collected in Alberta for reuse or recycling?

☐ (a) tin cans
☐ (b) newspaper
☐ (c) aluminum cans
☐ (d) plastic bags
☐ (e) plastic beverage containers
☐ (f) appliances
☐ (g) computer paper
☐ (h) oil
☐ (i) tires
☐ (j) glass jars
☐ (k) plastic food containers
☐ (l) glass bottles
☐ (m) cardboard boxes

Landfills

"No matter how you look at it, you can't get away from landfill," says Alberta Environment's John Slupsky. "There is always some residue that has to be got rid of. Landfill is the best, in fact the only answer." A sanitary landfill is an engineered and carefully designed facility operated in a planned manner on a site that is suitable. It is always supervised and a 15-centimetre layer of clean soil is spread over it every day.

For most people, however, the word landfill conjures up the image of a smelly old garbage dump.

Question #2:
Of the more than 700 active landfills in the province, how many are supervised?

☐ (a) fewer than 100
☐ (b) between 100 and 200
☐ (c) between 200 and 300
☐ (d) more than 300

The sanitary landfill also has a better record in terms of the number of months and years that it can be used before a new site must be located.

It is important to maximize the lifespan of the landfill. One way is to reduce the volume of material at source by encouraging sorting and recycling. Another is the segregation and treatment of wastes at the site.

Question #3:
The average lifespan of a sanitary landfill is:

☐ (a) less than 10 years
☐ (b) between 10 and 20 years
☐ (c) between 20 and 30 years
☐ (d) more than 30 years

Is used lube oil collected for recycling?

Hazardous Wastes

Alberta generates about 92,000 tonnes of hazardous waste per year.

The Swan Hills special waste management facility, a joint venture between Bow Valley Resources Ltd. and the Alberta Special Waste Management Corporation, will be fully operational by 1988 and able to handle all Alberta-generated organic and inorganic wastes.

Special wastes will be properly treated before disposal. The treatment includes filtration, separation, neutralization and solidification for inorganics such as acids, alkalis, metal sludge, photo sludge, asbestos and sulphur; high temperature treatment is used for organics including oils, solvents, tank bottom sludge, infectious wastes and PCBs.

Question #4:
The approximately 3,000 substances identified in the Hazardous Chemicals Act are considered hazardous because they are toxic.

☐ (a) true
☐ (b) false

The Special Waste Management System includes collection centres and transfer stations, transportation, a testing laboratory, secure storage and the Swan Hills central treatment facility (including secure landfill and deep well disposal facilities.

The province will set and enforce standards, license facilities and monitor operations, while private industry (Chem-Security Ltd.) will handle plant operation, manage the transportation and participate in transfer and collection stations. Special waste transportation rates will be uniform throughout the province regardless of location, enabling all generators of hazardous wastes to transport their wastes to the Swan Hills facility at an equal cost.

Question #5:
When the Swan Hills special waste treatment plant is completed, all hazardous wastes in the province will be disposed of there.

☐ (a) true
☐ (b) false

Look around at the containers in your own kitchen, basement, garage and garden shed. Many of them carry the familiar labels indicating toxicity, flammability, corrosiveness, or explosion potential. You know to keep them out of the reach of children, but do you know how to dispose of household hazardous products such as solvents, paint, bleach, drain cleaners, herbicides, pesticides and pharmaceuticals?

Question #6:
The best way to dispose of these goods is to:

☐ (a) seal them in a container and put them out with the rest of your garbage.
☐ (b) dilute them and pour them down the sewer.
☐ (c) dilute them and pour them over some sterile part of your grounds such as a gravel driveway or between cracks in your sidewalk.
☐ (d) bury them in your garden.
☐ (e) none of the above.

ANSWERS

Answer #1: (b), (c), (e), (g), (h), (j), (l), (m) Give yourself 2 points if you got them all, 1 point for 3 or more.

Top of the list is newsprint, computer paper and cardboard containers. Although newsprint has a high public profile because of the important role of the individual and the community in collection, high grade paper, such as computer paper, is the most valuable recyclable resource. There is also a high demand for cardboard for recycling into building material.

Aluminum cans, plastic beverage containers and glass bottles are collected at bottle depots. Up to 95 per cent of all liquor and wine bottles sold in Alberta are returned through the depot system which also collects glass jars.

Used oil is collected at approximately 350 gas stations across the province participating in the Oil Drop Program. In 1983 this amounted to 36 per cent of potentially recoverable lube oil. Each community chooses its own method of collection; Alberta Environment's waste management branch helps with technical advice and storage tank monitoring. Although tire collection is easy, there is currently no viable recycling market in Alberta and tires are stock-piled at landfill sites. Some of the newer landfills have separate areas for different wastes which makes the recycling of certain products, such as appliances, easier.

There are plans for a pilot multi-material curbside collection scheme which will be tested in Alberta within the next year.

"We are probably looking at three commodities: paper, regular waste and one other material, possibly metal", says Joe Kostler. "The project will kick off with a public information program — this has been the key to the success of similar programs in other parts of the country."

Answer #2: (a) Fewer than 100 landfills are supervised.

In fact the figure stands between 50 and 60. There are also "modified" landfill options available to smaller communities and co-operating regional groups. These have similar siting regulations, but are not supervised and are covered with clean soil only once every few months.

FRED KATZ

Edmonton's Sundance Housing Co-op raises a little extra money by recycling.

Covering refuse with clean soil at a small landfill.

"There are lots of problems associated with unsupervised sites," says Ed Collom, assistant manager with Environmental Health Services — "the improper dumping of materials, illegal fires, dumping of hazardous wastes, sites being used up faster than necessary due to improper construction.

Sometimes these sites erroneously carry a "Sanitary Landfill" sign which further fuels the public confusion and misinformation which makes the siting of new landfills a real problem.

Roy Neehall, chief solid waste engineer with the City of Edmonton says, "the final decision has to be political." Almost every site will have an impact on some group or industry. The problem he says, is the NIMBY syndrome — Not In My Back Yard.

The Regional Waste Management Assistance Program is designed to assist smaller communities in developing regional sanitary landfills which will then replace several smaller landfills. The program provides hydrogeologic investigation of selected sites and most capital costs required in the development. It is hoped that most unsupervised sites will gradually be phased out.

Answer #3: (b) Between 15-20 years

According to Neehall, the life span of the landfill depends on three things, "The end use plan — the design, engineering and construction; the reduction of waste before it is put on the landfill; and the compaction of waste in the landfill."

Waste can be reduced before landfilling by shredding, incineration, or pre-compaction such as baling. The treated waste is then easier to handle, produces less odor and wind-blown litter, as well as occupying less landfill space. Most modern landfill sites segregate materials; tires, for example, create problems in a landfill because of their bulk, their tendency to float to the top and to trap air and toxic gases.

The optimum on-site compaction, according to Joe Kostler, is "compaction with a heavy tracked vehicle or special compactor which drives over the material three times."

Brian Free, a research officer with the ECA, is interested in the recovery of energy from the incineration of solid waste. This process has been successful in other parts of the world. However, the current slump in oil prices will have a negative impact on this potential.

Brian Free

Composting of organic material is also used in other parts of the country to reduce the volume of waste material. But Alberta's cold winters limit this option.

Answer #4: (b) False.

The definition of hazardous wastes has always posed a problem.

"All substances have the potential to be hazardous under the wrong conditions," says Dr. Walter Harris, professor emeritus in the U of A's Department of Chemistry.

ALBERTA SPECIAL WASTE MANAGEMENT CORP.

Laboratory-administration building at the Swan Hills special waste management facility

The make-up of the substance as well as the amount and the conditions under which it is used has to be taken into consideration.

The ASWMC defines hazardous waste as a substance which "due to its nature and quantity or persistence is potentially dangerous to human health and the environment and requires special treatment and disposal to eliminate the hazard." The substances may be toxic, flammable, carcinogenic, mutagenic, may produce or spread disease, become concentrated in the food chain or be radioactive.

Answer #5: (b) False.

Some hazardous waste will continue to be disposed of on site.

"It's not so much the content of the hazardous wastes but the volume that dictates where it is disposed of," says Ken Simpson. "If the amount is large enough, it is more economic for industries to treat it on site."

Companies like Dow Chemical Canada Inc.'s western division have secure on-site landfills and they also may use bio-oxidation, incineration and deep well injection.

Most oil industry waste is handled on site in approved disposal facilities.

As of August 1, 1985, hospitals have been required to render their wastes non-pathogenic before disposal; most larger hospitals do this on site.

Some concern has been expressed that since use of the Swan Hills facility is voluntary under the Hazardous Chemicals Act, companies may store wastes rather than paying the price for treatment. According to Ken Simpson, this matter is under consideration.

"There are currently no regulations in place, but the question of limited storage time is being discussed."

Answer #6: (e) none of the above.

Currently some substances listed under the Hazardous Chemicals Act which are in common household use are exempt *when they are used as household products.* This may change when the Swan Hills plant is in operation and the collection centres are in place, although proper disposal would be hard to enforce.

There are some hazardous chemicals disposal sites available to the public, the University of Alberta disposal facility at Ellerslie, for example, but few people are aware of them.

Once again the answer lies in public education and individual responsibility.

"It's up to the individual", says John Slupsky. "Monitoring is impossible — it would mean going through everyone's garbage cans."

When the Swan Hills facility comes on stream, local collection centres and better information will mean the safer disposal of at least some potentially hazardous household chemicals.

Hazel Sangster is an Edmonton freelance writer.

How did you do?

Subtotal
(number of correct answers): ☐

by Eric Bailey

Wildlife

Endangered species, vanishing habitat, crop damage, introduced species, threatened fisheries and poaching — this quiz might seem like still more doom and gloom from the wildlife front.

Not at all. It's encouraging that even though you might have trouble getting the answers to some of these questions, it wasn't so very long ago that no one knew any of them. No one.

The issues here affect agriculture, tourism, forestry, mining, manufacturing, oil and gas development and electrical utilities — the entire Alberta economy, in short.

On the other side of these issues are at least 90 species of mammals, 50 species of fish, 20 species of reptiles and amphibians and 1,700 types of plants. A 1985 Alberta Fish and Wildlife report put the economic benefit of those species at more than $1 billion.

There's broad agreement that the more we know about wildlife, the better chance we have of preventing the best interests of man and animal from conflicting with each other.

Certainly such a principle is wise and the pursuit of answers is sensible, even practical.

There's more to it than good sense, though. In 1981, four out of five Canadians surveyed told the Canadian Wildlife Service that maintaining abundant wildlife is important.

At least one in five Albertans make special trips every year just for the chance to see wildlife.

Is this practical?

Is the reintroduction of the swift fox into Canada after an absence of nearly 50 years sensible? No Foxes Unlimited pours millions of dollars into the project for the benefit of future hunters or trappers. No international travel agency has begun to book tours to the grassland south of Manyberries to see the plucky fox bound back from the brink of extinction.

The swift fox is being bred in captivity in hopes it will once again thrive on the prairies.

Curt Schroeder, a research associate at the University of Calgary, is part of the reintroduction program sponsored by his university, the federal government and the three prairie provinces. He says they raise the foxes from two pairs imported from Colorado in 1973. Researchers have released 47 of the house-cat-sized animals since 1983, and another 55 await their turn.

Project staff hope to establish a small breeding population but a high proportion of the foxes die after release — many falling prey to coyotes. Schroeder thinks his charges just need time to establish escape routes. "After two or three years, mortality may decline as they get used to the wild," he said.

The program continues in the hope that answers will appear and the foxes will succeed.

In the meantime, we root for these victims of over-trapping and poisoning that disappeared from Canada in 1938. Why?

Because we think wildlife and wild places are important. Because even if we never see a swift fox in the wild, we feel it deserves a place in the landscape it was driven from. But why?

There's no answer here for that question although you might try anyway because it is so important.

However, here are six questions about wildlife in Alberta for which we *were* able to find some factual and perhaps surprising answers.

QUESTIONS

Worldwide, we direct more and more of our wildlife management efforts at preventing the extinction of species. Organizations such as the International Union for the Conservation of Nature gather information and make lists of the species which are in trouble. Putting the information in a useful form and agreeing on what it means can be surprisingly difficult.

Question #1:
Here at home, Alberta Fish and Wildlife has made a list of endangered, threatened and vulnerable mammals and birds. How many species are on the Alberta list?

☐ (a) fewer than 10
☐ (b) between 10 and 15
☐ (c) between 15 and 20
☐ (d) none

Many man-made threats to wildlife can be overcome. Hunting quotas or bans can be imposed, deadly pesticides such as DDT can be replaced by less toxic chemicals, polluted rivers can be cleaned up and better managed. However, habitat loss through settlement, agriculture, resource exploitation and transportation usually can't be reversed without curtailing an important human activity.

Question #2:
Which of the following species is endangered or threatened primarily by loss of habitat?

☐ (a) woodland caribou
☐ (b) peregrine falcon
☐ (c) swift fox
☐ (d) wood bison
☐ (e) all of the above

Alberta's agricultural produce tastes just as good to wildlife as it does to livestock. And it's a lot easier keeping the corn safe from cows than from the host of wild critters who also have their eyes on it.

The Alberta Hail and Crop Insurance Commission has received $2.7 million in claims for crops damaged by wildlife in 1985 and the total continues to rise.

Question #3:
Which of the following cause the most crop damage every year?

☐ (a) waterfowl
☐ (b) beavers
☐ (c) mice and rodents
☐ (d) deer and elk
☐ (e) antelope

At the Brooks Wildlife Centre, nearly 100 Himalayan snow cocks await the day they'll be free in the Canadian Rockies.

That day may never come. It has been three years since the birds were imported from Nevada by Alberta Fish and Wildlife as a potential game bird. But wildlife officers still aren't sure whether they should introduce the snow cocks.

They would add variety to bird hunting. But they might also compete for alpine and subalpine habitat with native ptarmigan.

Many bird hunters favor the scheme. But, the national park system opposes it.

One officer described Fish and Wildlife's position on the program as "nervous".

Question #4:
If the snow cocks make it into the wild, they won't be the first non-native species introduced here. Which of the following *are* natives?

☐ (a) the starling
☐ (b) the Hungarian partridge
☐ (c) the ring-necked pheasant
☐ (d) all ☐ (e) none

Water covers just 2.5 per cent of Alberta. That's the fifth lowest water-to-land ratio in Canada. Yet, according to the legislative report of the Select Committee on Recreational and Commercial Fishing Industries in Alberta in 1980, more than 350,000 anglers are active in the province, catching over 7.1 million fish.

That's big business: "Alberta's estimated sport fishermen annual expenditures and extra market benefits for 1978-79 exceeded $134 million and $23 million respectively," the committee reported.

The Bow River through and downstream of Calgary may be the finest dry fly-fishing trout stream anywhere and it attracts anglers and their welcome foreign exchange from all over the world. John Eisenhauer, executive director of Trout Unlimited in Calgary, points out that although Alberta has 12,000 km of trout streams, only 365 km are of the Bow's premium quality.

Both the legislative committee and Trout Unlimited agree this resource may decline rapidly if not properly managed.

Question #5:
What is the most imminent threat to premium trout fishing in the province?

☐ (a) siltation from forest harvesting
☐ (b) pollution from municipal sewage
☐ (c) agricultural pesticides
☐ (d) dams and diversions

After a three-month undercover investigation, Alberta Fish and Wildlife charged four Albertans early this year for illegally hunting at least 150 moose and trafficking in the meat. Obviously, poaching isn't just a high-stakes gamble taken by wealthy foreign trophy hunters. It's also a big local problem — no one knows how big.

To help manage wildlife, enforcement officers rely on public compliance with regulations. Not everyone is disposed to comply, though. And not all of these get caught.

Question #6:
Of the hunters and fishermen who break wildlife laws, what fraction get caught?

☐ (a) 1 in 50 ☐ (b) 1 in 20 ☐ (c) 1 in 10
☐ (d) 1 in 5 ☐ (e) 1 in 2

Moose have a large range throughout Alberta wherever suitable habitat is found

ANSWERS

FISH AND WILDLIFE

The Himalayan snow cock may become Alberta's newest game bird but biologists are undecided.

Answer #1: (b) between 10 and 15

The list consists of 11 species: **endangered** (existence in Alberta in danger of extinction within the next decade) — peregrine falcon, whooping crane, wood bison, swift fox
threatened (likely to become endangered if factors causing vulnerability are not reversed) — burrowing owl, ferruginous hawk, woodland caribou
vulnerable (likely to become threatened if factors causing vulnerability are not reversed) — piping plover, mountain plover, trumpeter swan, white pelican

Gary Erickson, senior non-game biologist at Alberta Fish and Wildlife in Edmonton, admits the list is incomplete, lacking species of reptiles, amphibians, insects, fish and plants.

"It's based on our current knowledge of the species we've looked at. In the amphibian and reptile groups we simply don't have enough knowledge. We're trying to get that information right now," he said.

Plants are outside Fish and Wildlife's mandate but Ann Smreciu, a botanist at the University of Alberta Devonian Botanic Gardens in Devon, says she and her colleagues have made a good beginning on that part of the list.

"We've just started the Canadian Plant Conservation Program. We have a tentative list of rare native plants in Canada and have sent it out to universities, botanical gardens and arboreta across the country for comment.

"When we get it back and put into a data base, we can feed information to the IUCN."

Are you a new reader?

Environment Views will be distributed free at all Environment Week activities throughout the province. If you picked this copy up at one of the locations, or are reading a friend's, welcome. Environment Views covers topics of environmental concern to Albertans, providing facts and a forum for a range of views. If you're interested in Alberta's environment, send in the card and become a subscriber. It's free. If the card is missing, phone or write to us at the address inside the front cover.

Answer #2: (a) Woodland caribou's greatest threat comes from lack of habitat.

Dr. Geoff Holroyd, head of the threatened species section of the Canadian Wildlife Service in Edmonton, says there are fewer than 20 distinct populations of woodland caribou left.

They feed on tree lichens in mature and overmature forests in winter. Clear-cutting and coal development have eliminated some habitat while highways and pipelines have disrupted their migration routes.

ANSWERS

Releasing pheasants into the wild in time for hunting season

The decline in peregrine falcon numbers is ascribed to the use of eggshell-weakening DDT earlier this century. Now being re-introduced to the prairies, the swift fox was hunted and trapped for fur and ran afoul of predator control programs aimed at coyotes. Overhunting affected the wood bison but it has also been plagued by anthrax, tuberculosis, brucelosis and liver fluke contracted from pastureland where infected domestic cattle had grazed.

Habitat loss can threaten such species as the white pelican which have high numbers but breed in only a few locations.

Canada geese having a feed at a farmer's expense before the long flight south

Answer #3: (a) Waterfowl cause the most crop damage each year.

Larry Bannerman at Alberta Hail and Crop Insurance's Lacombe headquarters says $2.6 million of the 1985 wildlife damage claims are due to waterfowl.

"If you have a real nice fall, get crops off early, the birds fly south late and everything's okay," Bannerman said. "But you have a wet fall, get crops off late, the birds fly south early and feast in the grain fields.

"Last year was extremely bad. At least 2,500 crops weren't even combined."

It was an extremely good fall for the picnicking wildlife listed on the damage claim form: antelope, bear, deer, ducks, elk, geese, moose, sandhill crane and other.

One of those "other"s appears more and more often on claim forms: pocket gophers.

"There probably weren't very many in the native prairie," says Dr. Michael Dorrance of Alberta Agriculture's problem wildlife section. "They're primarily a broad-leafed plant eater and by planting legumes we've created perfect pocket gopher habitat."

This strong mouse-like rodent plays havoc with a hay field, tunnelling extensively to eat roots, killing plants outright or smothering them with huge mounds of excavated dirt.

ANSWERS

Edmonton hosts the largest population of overwintering Bohemian Waxwings in North America.

Pocket gophers reduce yields up to 16 per cent and cause wear and tear on machinery. As Dorrance says: "a pocket gopher mound doesn't hay or rake worth a damn."

Answer #4: (e) None of these species is native to Alberta.

The partridge and pheasant were brought here for sport hunting. The hardy common starling got to Alberta on its own after being introduced to the United States in the 19th century.

Margot Hervieux, chief naturalist at the John Janzen Nature Centre in Edmonton, says starlings and house sparrows were brought to New York by immigrants who missed native English fauna.

"Starlings and house sparrows compete for nest cavities with such native species as tree swallows and mountain bluebirds," she said. Aggressive early nesters, the newcomers usually win.

"Mountain bluebirds declined drastically in the '50s and '60s, coinciding with the movement of house sparrows and starlings into the prairies," said Hervieux.

Even some plants get human help in settling the province. Hervieux says mountain ash brought to western cities as ornamental trees have begun to proliferate in such natural areas as the river valley in Edmonton.

Ash berries are a favorite food of Bohemian waxwings and Hervieux says that Edmonton, formerly abandoned by the birds each fall, now hosts the largest population of overwintering waxwings in North America.

There may be another foreign creature ready to move in — the European ferret, a small, furry animal imported by a few western pet stores.

"They're wild in Britain," said Hervieux, "and certainly wouldn't have any trouble surviving here. If they escape, they're very effective predators of ground-nesting songbirds."

Answer #5: (d) Dams and diversions pose the most imminent threat to the trout fishery.

Eisenhauer says projects that "suck water out of natural streams and don't leave enough for a premium quality fishery" have become the major threat.

He believes the Oldman River Dam, due to be completed by 1991, will alone destroy nearly 20 per cent of the province's premium trout fishery.

"A dam or diversion need not be a threat," says Bryan Kemper, head of Alberta Environment's environmental assessment section. "We recognized at the outset that the Oldman Dam would have serious impact on local trout fisheries and we are trying to come to grips with what must be done to offset that loss.

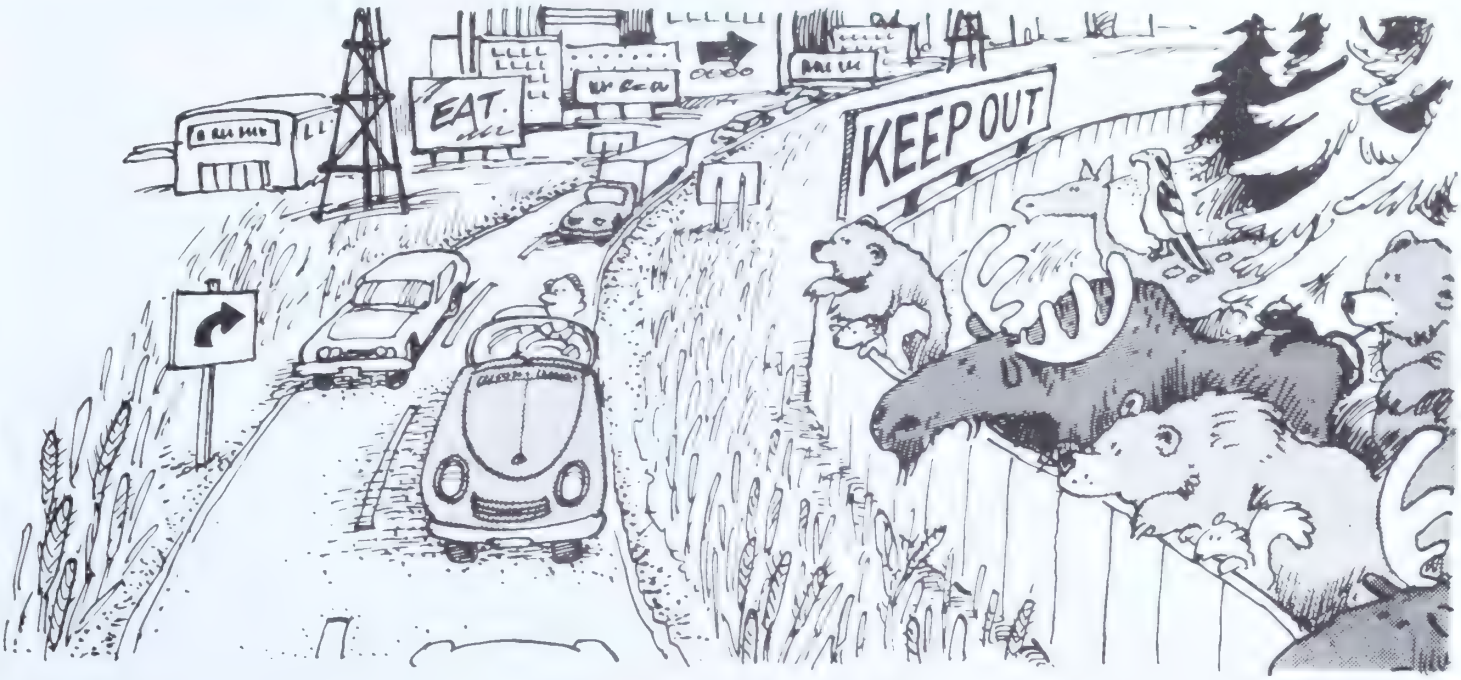
"We can never replace each individual riffle and chute and pool, however, there are good opportunities to enhance the fishery up and downstream."

Kemper likes to point out that the world-class Bow River fishery lies between dams upstream and diversions downstream. This has made the Bow the most stable stream in the province, good for trout and anglers alike.

Eisenhauer grants that a well-funded mitigation program may minimize fishery loss in the Oldman system. But he worries about the insidious impact of overall land use patterns on the streams.

"Cattle impacting stream banks, beaver management (good and bad), effluents from municipalities and industry, runoff from feedlots, highways and airports all degrade trout streams and reduce fish populations," he says.

ANSWERS



MARTHA [illegible]

"Reversing the process is a long-term, uphill battle that will cost millions and millions of dollars."

Answer #6: (b) One in 20 hunters and fishermen who break wildlife laws are caught.

That figure's "about right", according to Allan Farrants, a standards officer with Alberta Fish and Wildlife in Edmonton. "It's like speeders — what fraction do the police catch?" he asks.

What Farrants knows for sure is that the chances of getting caught increase with the frequency of violation and "the chances of getting caught for poaching as a way of life are very high."

The enforcement problem seems to be one of manpower. Farrants says they have about 115 officers in the province to look after more than two million users in a year.

Alberta Fish and Wildlife has about 115 standards officers in the field to enforce wildlife laws

"My personal feeling is there are not enough officers," says Lyle Fullerton, executive director of the Alberta Fish and Game Association. "The association has always asked overall for more enforcement.

"Look at the number of anglers and hunters and user days and it's pretty incredible," he says and then rhymes off a staggering list of statistics for 1980: 6.3 million fishing days, 2.5 million hunting days, 3,000 registered and 10,000 resident trappers accounting for $15 million worth of furs, 2,300 licensed commercial fishermen, about 1,000 class A and B guides and 50 licensed outfitters serving about 4,000 non-resident hunters and 16,000 non-resident anglers.

Fullerton says the officers have been getting some help from the public recently, though.

"Fish and Wildlife is to be commended for implementing its Outdoor Observer hotline," he said, referring to a Crimestopper-like program in which the public can report hunting and fishing infractions using a toll-free telephone number (1-800-642-3800).

Eric Bailey is a freelance writer specializing in outdoor and interpretive writing, working from Alder Flats, Alberta.

How did you do?

Subtotal
(number of correct answers): ☐

by Norma Ramage

Air Quality

What share of our air quality problems are caused by vehicle emissions?

The air that we breathe is something most of us take for granted — most of the time. We don't give much thought to air quality except on certain rare days when a smelly, whiskey-colored inversion layer hangs over Calgary or a wind switch brings something other than fresh spring scents wafting from Edmonton's Refinery Row.

But those situations are the exception rather than the rule in Alberta. Smog is something we read about but rarely experience. We take it for granted our fresh air is just that — fresh and clean.

And for themost part it is, says Al Schulz, head of Alberta Environment's air quality control branch. He says air quality in Alberta is not only good, in some ways it's better than it was a decade ago.

But just because air quality is generally good in Alberta doesn't mean the public should get complacent or that industry and government should rest on their laurels.

Alberta Environment keeps a close eye on air quality in both urban and rural areas with a comprehensive system of monitoring. Industry is also watched closely to make sure it does not exceed licensed emission levels and if necessary, companies can be taken to court for violations.

Along with this concern over outdoor air quality, there is growing interest in how good our indoor air is. People spend more than 70 per cent of their time at home or in an office, and in the last few years experts have been taking a close look at indoor pollution.

What they've discovered is that there are as many sources of pollution indoors as out. Indoor air can contain pollutants such as smoke, dust, bacteria, carbon monoxide and chemicals such as formaldehyde.

All this points up the fact that although Albertans aren't likely to be faced with smog alerts in the near future, air pollution is just as much a fact of life here in the clear, wide open spaces as it is in the more congested areas of the world.

And we must also remember that the layer of atmosphere we depend on for our very lives is only between eight and 16 kilometres deep. Into this limited area, humanity is dumping thousands of tonnes of garbage every hour of every day.

The Air Quality Branch of Alberta Environment uses a federally-developed system called the Index of Quality of Air (IQUA) to monitor the level of pollutants. It measures five contaminants: nitrogen dioxide, sulphur dioxide, carbon monoxide, ozone and the coefficient of haze (dust and other particles in the air). The index goes from zero to 100 with zero to 25 considered good air quality; 26 to 50, fair; 51 to 100, poor; and above 100, severe.

The index includes daily and hourly peaks of each pollutant and mean monthly index readings for each pollutant. The peak refers to the highest level a specific pollutant has achieved, explains Don Kupina of the air quality branch.

Three permanent monitoring stations are located in both Edmonton and Calgary. Readings are taken at 8:15 a.m. and 3:15 p.m. every working day of the year. There is also a permanent monitoring station in Fort McMurray and portable units test air quality elsewhere in the province.

Question #1:
During 1984, the most recent year for which index data has been tabulated, how often were peak monthly indexes above 51 in downtown Edmonton or Calgary?

☐ (a) never
☐ (b) about five times
☐ (c) about 10 times
☐ (d) more than 10 times

Question #2:
According to surveys in Alberta, what is the major source of urban air pollution?

☐ (a) natural gas furnaces
☐ (b) motor vehicles
☐ (c) industry
☐ (d) incinerators

Emission standards for industry in Alberta are set by the Clean Air Act of 1971 which many experts consider to be one of the toughest, most comprehensive pieces of air quality legislation in North America.

Under this system, Alberta Environment grants licences to industry and allowable emission levels are specified in the licence after negotiations between the department and the individual company.

If emission standards are violated, Alberta Environment, which enforces the Clean Air Act, can issue a stop work order or prosecute the offender in the courts.

Indoor air can be hazardous to your health

Indoor Air

Question #3:
In 1985, how many charges were laid by Alberta Environment under the Clean Air Act?

☐ (a) none
☐ (b) fewer than 10
☐ (c) between 10 and 20
☐ (d) between 20 and 30
☐ (e) more than 30

It comes as a big surprise to many people to discover that air pollution isn't something you leave behind when you walk indoors.

However, it's only recently that scientists have started looking more closely at indoor air pollution and some of its causes. Some of the culprits that have been identified are insulation, carpet glue, the synthetic materials used in furniture, natural gas, solvents, paints and building materials such as acoustic tiles and various lining materials which may contain asbestos. There are also such unpleasant human byproducts as dead skin cells, mucus, spittle and disease germs.

Question #4:
In general, there is a higher concentration of pollutants indoors than outdoors

☐ (a) true or ☐ (b) false

In the energy-conscious '70s, a lot of publicity was given to conserving energy.

Everyone learned about preventing heat loss by adding insulation, sealing windows and looking for loose doors, unsealed windows and other "heat robbers". Despite this, Alberta Environment figures show one third of the heat loss from an average Alberta home is due to air leakage and homeowners are continually looking for ways to seal their homes and make them more energy-efficient.

According to Goldie Edworthy of the conservation branch of Energy and Natural Resources, properly sealing a home can save the average Albertan between $150 and $200 a year, so it's understandable, he says, that Alberta builders "build tight".

Question #5:
If a home is tightly sealed, indoor air quality problems will result.

☐ (a) true or ☐ (b) false

There is no one source of indoor air pollutants. In the workplace, pollutants can come from building materials, machinery, cleaning utensils and solutions.

In the home, insulation, solvents, carpet glues and the material used to make chesterfields, chairs and mattresses are all sources of pollutants.

Your own smoking habit or that of your next-desk neighbor can also deliver pollutants to your lungs.

Indoor pollutants can cause a myriad of health problems such as headaches, dizziness, irritated eyes and fatigue. Most of the health concerns are minor, but in 1976, the outbreak of Legionnaire's Disease which took 29 lives in the United States was linked to bacteria which were probably circulated through a contaminated air-conditioning and humidifying system.

Question #6:
Of the following common contributors to indoor air pollution in the home, which poses the most serious threat to health?

☐ (a) formaldehyde from drywall, papers, house sealants and other household products
☐ (b) the combustion products from gas ranges and other gas applicances
☐ (c) smoking
☐ (d) the breakdown products from synthetic materials in rugs, curtains and furniture

ANSWERS

Answer #1: (c) Peak monthly indexes were above 51 in downtown Edmonton and Calgary about 10 times.

The precise answer is 11 times: four times in Calgary and seven times in Edmonton.

The highest peak index for Calgary was 78 in December while the highest in Edmonton was 70 in September.

However, all this doesn't mean we're ready for surgical masks and special breathing equipment. Don Kupina of the air quality branch says the peak index relates to the highest level of of pollutant during a one-hour period. High index readings don't mean that the air quality was poor hour after hour or day after day during that month.

"It's usually a short term, local condition that causes the problem," explains Kupina. For example, in Calgary, heavy construction work on Light Rail Transit might force the coefficient for haze up into the higher numbers because of all the dust in the air. Or a temperature inversion may bottle pollution in the downtown area during early morning hours before a strong wind returns air quality to normal.

Answer #2: (d) Motor vehicles are the major source of urban air pollution.

"Almost every air pollution problem in cities is related to the automobile," says Kupina, the man responsible for monitoring air quality in the Edmonton region. And the automobile shares responsibility with trucks and buses.

Alberta Environment emission inventory for 1982 showed that 87 per cent of emissons in Calgary were caused by motor vehicles compared with 79.8 per cent in Edmonton. This amounted to 141,000 tonnes of pollutants in Calgary and 135,000 tonnes in Edmonton.

Every day, day in and day out, vehicles belch out a wide variety of pollutants. They include carbon monoxide (CO), a colorless, odorless, tasteless gas produced by incomplete combustion of fuel; oxides of nitrogen (NO_x) formed by combining oxygen and nitrogen high-temperature combustion; and hydrocarbons (HC) which are the traces of unburned fuels.

Despite the push to find alternate, low pollution fuels such as propane and alcohol and to encourage Albertans to leave their cars at home and ride buses and Light Rail Transit systems, the internal combustion engine remains the major villain in eroding our urban air quality.

FRED KATZ

Al Shulz

Answer #3: (b) fewer than 10.

To be precise, only six charges were laid under The Clean Air Act in 1985 but Al Schulz, head of Alberta Environment's Air Quality Control Branch, isn't worried about the small number.

That's because Schulz believes there are better ways to ensure compliance than by dragging industries into court.

"The process of going into the courts takes a long while. Once we lay a charge, the company is often reluctant to implement any changes until the charge is heard. And while this is going on, nothing is being done to relieve the environmental problem. The issue isn't being resolved."

The preferred route of Alberta Environment, says Schulz, is what he calls enforcement and what others call negotiation. "We find that we see results within a month this way where if it went before the courts, it would take six months to a year to clean up the problem."

But Linda Duncan, executive director of theEnvironmental Law Centre in Edmonton, believes the time for negotiation is when Alberta Environment meets with individual industries to set the maximum emission levels that are then included on their licences.

"Given that that's the system, if those licensing levels are continuously violated, the violators should be charged and the matter should be decided by a court."

Duncan points out that she's not advocating every violation be prosecuted, just "continuous and blatant violators."

But Al Schulz is not convinced more prosecutions — no matter who carries them out — will solve the problem. "Litigation is a way of penalty, not a way of control."

Answer #4: (b) In general, there is a higher concentration of pollutants indoors than outdoors.

No, your glasses aren't dirty and your eyes aren't failing. You read the answer correctly. There are more pollutants indoors than out. So many, in fact, that Jim Love of the University of Calgary says only half-jokingly, "When I hear about smog alerts and advice to stay indoors, it makes me wonder."

Love, who teaches in the university's faculty of environmental design, cites a recent U.S. study which showed levels of carbon monoxide, nitrogen dioxide, carbon dioxide and other pollutants are higher indoors than outdoors. "There are only about one-twentieth the amount of aldehydes (such as formaldehyde) outdoors as there are indoors," Love says.

"The reason is that outdoors there's more unrestricted air flow. A house is a container."

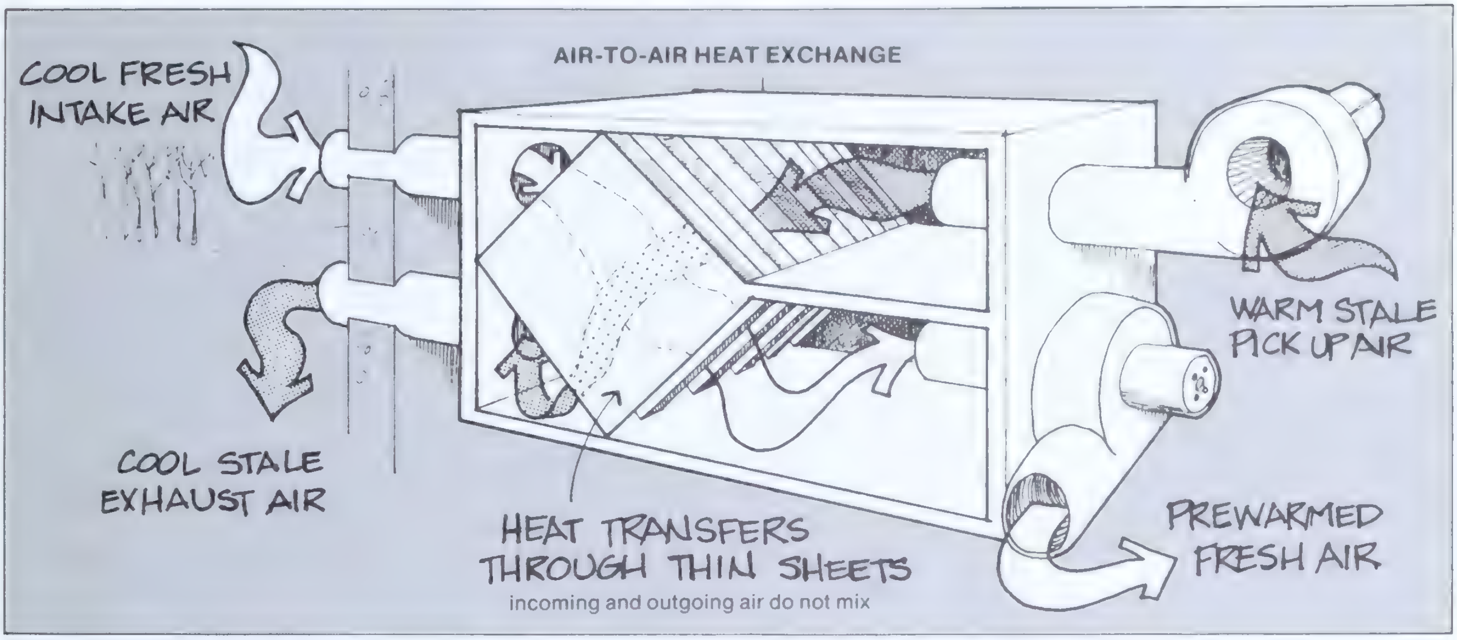
As well as coming from indoor sources, some indoor pollution can be caused by outdoor pollution drawn into the house or office. "We had problems at the day care centre at the university because the vent was at the truck loading dock and it was pulling in carbon monoxide," explains Love.

Despite all this, Love says the problem of indoor air quality is "far from being catastrophic". But, he adds, "We still need to learn more about it. We don't pay as much attention to the indoor environment and perhaps it's time we did."

Answer #5: (b) Indoor air quality problems won't necesarily follow from tightly sealing a home.

The more energy efficient you make your home, the more likelihood there is of a buildup of pollutants. But that doesn't have to happen, says Goldie Edworthy, superintendent of residential programs for Alberta Energy and Natural Resources' Energy Conservation Branch. Not if you make sure a home is properly ventilated.

"In the rush to save money by sealing



their houses, many homeowners forget that ventilation is a vital part of an energy-efficient house," explains Edworthy.

"When we advise on an energy-efficient house, we always include ventilation as a central factor. You can't bring this issue down just to tightening up. You have to put in a proper ventilation system and not worry about a little extra money. It's better to err on the side of safety rather than dollars."

Edworthy says that at least half the air in an average house must be changed every hour. If not, there can be a build-up of radon from inside walls and furniture and drywalling may ceate build-ups of formaldehyde. Harmful gases from the furnace or fireplace might also build up and could even have fatal results, says Edworthy.

To avoid this, tightly sealed houses must have an air-to-air heat exchange system to constantly draw in air from outside without wasting a lot of energy. Heaters and furnaces should vent directly to the outside.

Answer #6: (c) Smoking is a major source of pollution.

It's hard to believe how many horrible pollutants that little cylinder of paper and tobacco can produce.

Cigarette smoke contains harmful compounds such as carbon monoxide, nitrogen dioxide, hydrogen sulfide, formaldehyde, hydrocyanic acid and hydrogen cyanide. All of these, and particularly the last, a highly active enzyme poison, are more harmful than most other indoor air pollutants.

And the bad news keeps coming. Anyone who reads the newspapers or watches TV has been bombarded lately with a growing weight of evidence that breathing someone else's smoke can be as harmful as smoking yourself.

Judy Hancock, Edmonton-based president of Group Against Smoking Pollution (GASP), says people underestimate the risk of side-stream smoke. She says a recent Canadian Public Health Association study showed eight out of 10 people surveyed reported short term health problems such as headaches, eye irritations, sinus problems, sore throats, nausea and tiredness from side-stream smoke.

But she says it's the long-term effects that are really frightening. "Lung function impairment and increased risk of heart disease and lung cancer are the main problems. Health and Welfare Canada said recently 500 non-smokers die every year in Canada from lung cancer caused by second-hand smoke."

The one bright spot? "The problem is easy to solve," says Hancock. "Simply say there's no smoking here."

Norma Ramage is a Calgary journalism instructor and freelance writer.

How did you do?
Subtotal
(number of correct answers): ☐

Smoking is a major source of pollution

by Gillian Sniatynski

Sour Gas

B. M. BROWN

There is concern about the health of people and animals living near sour gas plants.

Alberta's sour gas industry is more than 60 years old. It's a major contributor to the province's economy, and its supply of byproduct sulphur has made Alberta one of the world's biggest exporters.

But sour gas is still regarded by some with concern, if not with fear. The reason sour gas is sour is that it contains hydrogen sulphide, which is highly toxic and must be removed before the gas can be marketed.

In 1982, some 45 per cent of the province's natural gas production came from sour gas wells, and about 23 per cent of the gas still in the ground is sour.

Natural gas reservoirs underlie most of Alberta (with the exception of the northeast part), and sour gas is found throughout the reservoirs. But the most significant finds of sour gas lie in four reservoirs that parallel the foothills and centre on Calgary.

"Sour Gas Alley," as it has been called in the industry, includes a gas field in the Whitecourt-Edson area; a big reservoir underlying Rocky Mountain House, Sundre, Olds and areas east of Highway 2; an area completely surrounding Calgary that extends from Crossfield in the north to Okotoks and Turner Valley in the south; and a small but productive gas field in the Waterton-Pincher Creek area.

In 1982, total production of sour gas amounted to 30 billion cubic metres. Most of it (61 per cent) contained less than two per cent H_2S. Of the rest, 32 per cent had H_2S in concentrations exceeding 20 per cent.

No one knows for sure why H_2S is present in some gas fields and not in others. According to some theories, the high temperatures and pressures that transformed vegetable matter into oil and gas millions of years ago produced H_2S when certain subterranean sediments and rock formations were present.

The need to remove H_2S from sour gas accounts for the presence, as of January 1986, of 203 sour gas processing plants. In 116 of them, insufficient sulphur is taken in to warrant its removal in elemental form, and the acid gases are flared. Fifty-three plants recover sulphur, and the rest use methods that produce a solid sulphide waste like iron sulphide.

Fears about sour gas relate partly to H_2S exposure during well blowouts. At concentrations of more than 600 parts per million, H_2S is deadly. But even at 20 ppm it can irritate eyes and so paralyze the sense of smell that its presence can't be detected.

Other fears relate to the processing of sour gas. Sulphur that's not recovered from the gas is dispersed from the plant as sulphur dioxide.

Emissions must comply with regulations set down by Alberta Environment which are the most stringent in the country, and there is a high level of industry compliance. But Albertans have become sensitized to the potential environmental impacts of the sour gas industry by events like the 1982 Lodgepole blowout, and the ongoing health concerns of residents near a gas plant at Pincher Creek. They are asking a lot more questions about safety and environmental protection.

Meanwhile, the sour gas industry contributed substantially to the estimated $8.9 billion earned by gas sales last year. It's big business . . .

Lodgepole is a memorable — and emotion-charged — word in the sour gas industry. Once associated mainly with thin pine trees, it now brings to mind one of Alberta's most severe sour gas well blowouts.

For nearby residents, there were claims of illness in people and animals, and fears — still not totally dispelled — about long-term health effects.

Though it is hoped that Lodgepole was an isolated case, and the proportion of well blowouts overall is not high, they are more

BILL McKEOWN

The Lodgepole gas well blowout has led to some "dramatic improvements" in safety practices.

frequent in sour gas wells. This is due to three factors: sour gas is highly corrosive and causes more equipment failures; blowout prevention procedures for sour gas wells are more complicated; and sour gas is found in deeper formations where wells, sweet or sour, have more drilling problems.

Question #1:
What proportion of sour gas wells blow out in Alberta?

☐ (a) about one in 50;
☐ (b) about one in 100;
☐ (c) about one in 200;
☐ (d) about one in 300.

Sour gas isn't marketable as it comes out of the ground. It contains hydrogen sulphide (H_2S), and it requires the technology of a gas processing plant to "sweeten" it by removing the sulphur.

Plants with an intake of less than 10 tonnes of sulphur a day are allowed to flare the H_2S to produce sulphur dioxide (SO_2) and water. Where sulphur intake is higher, it is mostly removed in elemental form. Today, it's a valuable byproduct of sour gas processing, and Alberta has become a major exporter. The 1985 sulphur production was 5.5 million tonnes.

About half the sulphur is used for fertilizer production, but the industry is also looking at some new uses. These include using sulphur to extend asphalt, providing a more durable road surface, and developing sulphur cement which, in some cases, may replace the more traditional Portland cement.

If fickle gas markets and enhanced opportunities for sulphur sales spur the industry to pay more attention to sulphur removal, environmentalists would be gratified.

The sulphur that *isn't* removed in elemental form is released as SO_2. The sour gas industry is currently the major source of acid-forming emissions in Alberta. Any increase in sulphur removal during the refining process proportionately decreases the level of acid-forming emissions.

Question #2:
On average, what level of sulphur is removed during sour gas processing in Alberta?

☐ (a) between 60 and 70%;
☐ (b) between 70 and 80%;
☐ (c) between 80 and 90%;
☐ (d) more than 90%.

Sulphur dioxide emissions from gas plants are a double worry. They can cause acidification and soil damage close to their source. And they can be blown long distances to do their damage far away.

The height of the stack used to disperse plant emissions is one way to control how much of any pollutant will linger locally. The higher the stack, the fewer the local problems — and the greater the likelihood of problems in other areas. Clearly, environmental responsibility calls for some sort of balance.

Acceptable stack height is determined by Alberta Environment by means of a computer model which takes into account local meteorological conditions, terrain, existing sources of pollution in the area, and the amount of effluent to be dispersed.

In Alberta, there is considerable citizen concern about localized effects of sour gas processing. People in the Pincher Creek area, for example, have long suspected that Shell's Waterton gas plant nearby has caused, or aggravated, health problems among local residents. Farmers near gas plants worry about soil acidification, and damage to vegetation and livestock.

Acid-forming emissions can be deposited in wet or dry form. When SO_2 combines with rain, for example, the result is the acid rain that is now such a controversial environmental issue in eastern Canada and the northeastern United States.

SO_2 gases can also be directly absorbed by the soil. This dry deposition may also contribute to soil acidity and vegetation damage.

Question #3:
In Alberta, what is the primary way that SO_2 is deposited downwind of gas plants?

☐ (a) dry deposition.
☐ (b) wet deposition.

ANSWERS

Alberta is one of the world's biggest exporters of sulphur

Answer #1: (c) About one in 200 sour gas wells blows out in Alberta — but that statement has to be hedged around with some explanations and qualifiers.

Of the 8,000 or so wells drilled annually in Alberta (last year there were 7,526), about 20 per cent have the potential to encounter sour gas, says Bill Wylie, drilling section supervisor for the ERCB. Of that 20 per cent, only about a quarter are successfully drilled. The blowout figure relates to the number of sour gas wells successfully drilled.

Blowouts aren't restricted to sour gas wells, or to wells being drilled. ERCB figures show that in the 10-year period from 1976 to 1985, there were 23 drilling well blowouts, five involving sour gas. In the same period, there were 104 blowout incidents at producing wells, 21 involving sour gas.

It's also important to note that, for statistical purposes at the ERCB, a blowout is a blowout whether it involves a trace of sour gas or the massive volumes discharged at Lodgepole.

Fortunately, blowouts on the Lodgepole scale are rare. There was loss of life, and damage to property, businesses and health. And, says Rob MacIntosh, a local resident and one of the co-ordinators of the provincial sour gas coalition, many people still feel they have been inadequately compensated for the losses they suffered.

The issue of compensation is the thorniest legacy of Lodgepole. The burden of proof remains with local residents, who must deal directly with the company from whom they are seeking compensation.

But in other ways, says MacIntosh, the Lodgepole blowout has resulted in some "dramatic improvements" — in inspection, enforcement, wellsite practices, training and emergency back-up.

The ERCB agrees. A new board publication ("Energy Alberta 1985") notes that many of the 39 recommendations of the Lodgepole Inquiry Panel have already been implemented, and others will be implemented soon. Among other changes, says the publication, "an uncontrolled flow of hydrogen sulphide, of the magnitude of the 1982 Lodgepole incident, would not be permitted today. The practice would now be to ignite the gas."

Answer #2: (d) More than 90 per cent of sulphur is removed during sour gas processing in Alberta.

In fact, the average recovery rate across the province is 97.3 per cent, but there are variations between plants, from around 95 per cent in an old plant to 99 per cent in a new one.

Recovery guidelines are set by the ERCB, which is now engaged in a review to see whether, in the light of new technology and the economics of gas processing, the present recovery levels are "appropriate."

Industry, predictably, argues that they are. Costs increase sharply as total recovery

ANSWERS

SO WE FOUND A WAY TO GET ALL THE SULPHUR OUT. AND NOW HE'S MIFFED BECAUSE THE FIRE AND BRIMSTONE SMELL LIKE TULIPS!
JONES

is approached. And, says David McCoy, an environmental scientist for Canterra Energy Limited, there are consequences other than costs.

Techniques to remove the remaining sulphur may themselves produce waste products like calcium sulphate or magnesuim sulphate. They may also be very energy-intensive.

McCoy concedes that the argument against 100 per cent sulphur recovery is largely economic. But he adds that industry would be more willing to "go all the way" if it could be demonstrated once and for all that present rates were causing environmental damage.

In the absence of any such demonstration, McCoy feels, money spent on achieving 100 per cent sulphur recovery might get better returns, environmentally, if it was directed elsewhere in the oil and gas industry.

Martha Kostuch is a member of the Environment Council of Alberta's public advisory committee, and of the special interest group involved in the ERCB's review of sulphur recovery guidelines. She disagrees with McCoy's argument.

"We have no proof that there is harm, but certainly we suspect that the emissons are causing problems," she says.

She also questions the validity of looking at costs of further sulphur recovery on an incremental basis.

"If the whole plant is still economically feasible if you remove that two per cent, then you should remove it."

Answer #3: (b) The primary way that SO_2 is deposited downwind of gas plants in Alberta is by dry deposition.

In a 1984 Environment Council of Alberta paper on the transportation and effects of acid-forming emissions, research officer Kimberly Sanderson explains that this is because Alberta's climate is fairly dry. In northern Alberta and Saskatchewan, for example, snow accounts for a much higher proportion of the precipitation than is the case, say, in southern Ontario and Quebec. Because snow picks up fewer atmospheric compounds, it doesn't add much to the acid input.

But bare summer soils can absorb SO_2 directly. The big question is whether SO_2 emissions downwind of gas plants are damaging soil and vegetation.

It's a dangerous question to answer, says Dr. Marvin Nyborg, a soil scientist at the University of Alberta, because "soils are made acid all over the province."

His very tentative answer is, "Yes, slowly, at some plants."

Others share his reluctance to see problems where none may exist.

Calgary-based agricultural consultant Jim Lore remembers studies he was involved in around gas plants some 15 years ago.

"At that time, around some of the large plants, in certain weather conditions at certain upset plant conditions, you could find injury to vegetation," he says.

"Since then, the regulations have been tightened substantially. Most large plants have tail gas clean-ups, and the emissions are about 15 per cent of what they used to be.

"Under those conditions I have not found vegetation injured by SO_2."

In fact, says Lore, he's not finding any impact on agriculture around the plants.

Dr. Bob Church of the department of medical biochemistry at the University of Calgary agrees with Lore that the composition of much of the province's soils has a lot to do with the fact that SO_2 damage appears to be slight.

"Here in southern Alberta we have a calcium layer 11 to 18 inches (28 to 46 cm) below the surface. That's a tremendous buffering layer."

Church notes that it's much easier to document damage from elemental sulphur than from SO_2 emissions. But here, too, the situation has improved.

Once, chunks of sulphur were blasted off the block and mechanically loaded onto box cars. In high winds, especially, this was a substantial environmental problem.

But with recent advances in slating (in which the sulphur block is made up of individual pallettes) and increasing use of liquid transportation of sulphur, there is "not really a big problem any more."

Gillian Sniatynski is a freelance writer and editor living in Drayton Valley.

How did you do?
Subtotal
(number of correct answers): ☐

by Eric Bailey

Acid Rain

It's one of your easier high school chemistry lessons: $H_20 + SO_2 = H_2S0_4$. This simple science happens at ambient temperatures and is easily repeated.

So easily, in fact, it repeats spontaneously in the skies over western Canada almost continually. For example, on a summer day, a smokestack puffs out some SO_2 (sulphur dioxide), along comes a cloud of H_2O (water vapor, in this case), smoke and cloud mix, and *voila:* H_2SO_4 (sulphuric acid). Should condensation occur, acid rain is the likely result.

The other chemicals frequently found in acid rain, the notorious oxides of nitrogen, are far less simple. They all contain a little oxygen and a little nitrogen but the proportions of the two vary and the ways in which they combine are complex. For simplicity, the symbol NO_x represents these polluting oxides which enter Alberta's atmosphere almost entirely as a result of the burning of fossil fuels. They also form acids which fall to earth as rain or snow.

This chemistry lesson travels well, lingering among the crumbling monuments of Europe, touching upon the blackened facades of Parliament buildings in Ottawa, filtering down among the ancient trunks of the Black Forest and visiting the renowned crystal lakes of the Canadian Shield from Labrador to Alberta.

Acid rain isn't strong enough to replace the electrolyte in your car battery but it is insidious and persistent. Stories of thousands of dead lakes, denuded forests, spoiled spawning streams, eroded statuary, rusted cars, ruined building materials, rashes, infections and breathing disorders had become common media fare long before the senior statesmen of the US and Canada agreed to spend billions finding solutions to the problem.

The known solutions divide themselves into two categories: how to reduce or stop emissions and how to repair the damage already done. In Alberta, we're hard at work on the former and haven't really had to do much about the latter.

As Alberta Environment's senior research manager, Dr. Harby Sandhu, points out, the province reduced its acid-forming emissions by 15 to 20 per cent between 1974 and 1982 while the number of sources nearly

Coal-fired electrical generating plants are among the contributors to acid-rain

QUESTIONS

doubled. Dr. Sandhu attributes continuing reductions to a combination of public pressure, government regulation and a desire on the part of industry to find and use technologies which lower emissions significantly.

On top of which, nearly all of Alberta is like one big antacid tablet, able to consume volumes of excess acidity before showing any adverse effects. Natural alkalinity buffers our soils and water systems against acid deposition.

Some areas lack this buffering, though. One third of the province's naturally acidic soils lie in the Peace River — Grande Prairie area where some farmers need to lime their fields with crushed calcium carbonate.

The Canadian Shield protrudes into the northeast corner of the province north of Fort McMurray. The thin, sandy soils and impervious granite bedrock there offer little buffering in an area close to major sources of SO_2 emissions.

The prevailing winds have helped us escape the full impact of even our own emissions. As emissions are carried away from the province on strong westerly winds, the air moving in to replace it is nearly devoid of acid-forming emissions.

And the proponents of wind power for the generation of electricity in Alberta see those same strong winds as a way to reduce our dependency on SO_2 and NO_x emitting thermal generating stations.

Like Dr. Sandhu, we have reason to regard Alberta's chemical equation with some optimism. The following questions, however, underscore the serious extent of the problem.

According to a 1984 Environment Council of Alberta report, this province is the largest producer of acid-forming emissions in western Canada. We accounted for 14 per cent of the Canadian total in 1978. Only Ontario and Quebec emit larger quantities.

It shocks most Albertans to learn that our province occupies the number three spot in this unsavory list. While experts agree we don't have an acid rain problem now, studies show we may easily have one in the future.

Question #1:
What is usually cited as the major cause for concern?

☐ (a) increased coal-fired generation of electricity
☐ (b) increased oil sands and heavy oil production
☐ (c) increased gas processing
☐ (d) increased auto emissions

The burning of fossil fuels also creates polluting oxides of nitrogen in amounts generally much less by weight than SO_2. In 1978, NO_x emissions totalled 377,700 tonnes while SO_2 emissions reached 526,400 tonnes in Alberta.

FRED KATZ

Dr. Harby Sandhu

In such highly industrialized provinces as Ontario and Quebec, SO_2 emissions outweigh NO_x by a factor of three but in such lightly industrialized provinces as Prince Edward Island and Saskatchewan, NO_x emissions exceed SO_2 emissions substantially.

Question #2:
With this pattern as a clue, can you identify which of the following is the major source of NO_x emissions in Alberta?

☐ (a) transportation
☐ (b) industry
☐ (c) coal-fired generation of electricity
☐ (d) none of the above

Patterns of acid deposition depend to the greatest extent on prevailing winds.

Deposition often creates a fan of damaged vegetation spreading out across the landscape downwind of the source. But emissions may stay aloft a very long time.

In the dry spells we've had in the last few years, Alberta's acid-forming emissions easily escape our boundaries, "flying right across North America" as one scientist put it.

The long-range transport of acid-forming emissions is the reason that much of eastern Canada's acid rain problems find their source in the United States.

Question #3:
What area of North America is the primary long-range recipient of Alberta's acid-forming emissions?

☐ (a) North Dakota
☐ (b) Manitoba
☐ (c) Northwest Territories
☐ (d) Saskatchewan

The Energy Resources Conservation Board estimates that 90 per cent of Alberta's electrical energy is generated in coal-fired thermal plants — among the major sources of SO_2 emissions in the province.

"The cost of sulphur dioxide will be high to future generations," says Orrin Hart, about the legacy of these plants.

Hart, a Claresholm-area rancher, is president of the Small Power Producers' Association of Alberta, a group consisting mainly of farmers and ranchers committed to generating electricity through small projects powered by wind, water and wood.

"Anybody who can compete fairly with power companies ought to be allowed to," says Hart, "All we want is the chance to demonstrate our ability to produce the power."

The ERCB is sponsoring a five-year study program to see how small producers can be integrated into the provincial system although the rate the small producer is paid for any surplus he generates under the program is well below what he pays to augment any shortfall.

Utilities such as Transalta say they would be prepared to pay more for power generated by small producers and would welcome them into the provincial electrical grid if government agencies would set a formula for fairly determining what a small producer's power is worth.

Question #4:
Although slow and uncertain, the growth of small power production, esecially from wind, seems assured in Alberta. Right now, how many wind generators produce power for the Alberta electrical grid?

☐ (a) fewer than 10
☐ (b) between 10 and 50
☐ (c) between 50 and 75
☐ (d) between 75 and 100
☐ (e) none

ANSWERS

ALBERTA AGRICULTURE

In the Peace River area, naturally-acidic soils are vulnerable to acid deposition. Some farmers must lime their fields with calcium carbonate.

Answer #1: (b) Increased oil sands and heavy oil production is the major cause for concern about future acid rain problems.

According to Alberta Environment, the top four sources of SO_2 emissions in the province stacked up this way:

Source of SO_2 emission	% of total
Extraction Gas Plants	44.6
Oil Sands Plants	25.3
Power Plants	17.8
Sour Oil Production	5.3

(Note that auto emissions don't even make the list.)

Although they're not in the lead yet, oil sand plants are big emitters of SO_2. It took 46 gas extraction plants to emit 25 per cent of the total. And still another oil sands plant and one heavy oil plant are slated for development.

Dr. Harby Sandhu, senior research manager for Alberta Environment is optimistic, though. "Emissions of sulphur dioxide per barrel of oil produced are steadily decreasing," he says.

"I think public pressure dictates that kind of reduction in emissions," he said, "and the government has really tightened the screws on the industry."

Dr. Sandhu says measurements prove the point: "From 1974 to 1982, emissions have decreased by 15 to 20 per cent overall even though the number of plants has increased. In 1974, 625.6 tonnes of SO_2 were emitted and in 1982, 488.3 tonnes were emitted while at the same time, the number of licensed sources of sulphur dioxide increased from 77 to 138."

It may sound like a numbers game but it may be a game we can win.

Answer #2: (a) Transportation is the major source of NO_x emissions here.

A 1983 report prepared for Alberta Environment lists transportation as accounting for 37 per cent of the NO_x emissions in Alberta.

The split between commercial and personal vehicles in contributing to transportation's share is about 70/30, meaning that our personal cars spewed out about 11 per cent of the NO_x floating around the province.

One of the report's authors, Donald G. Colley, manager of consulting and technical services at Western Research in Calgary, says that by the year 2000, transportation could account for much more of the NO_x

emission total than it does now.

"The longer the federal government delays in implementing emission control standards, the more significant the transportation sector's share of NO_x emissions will become, especially as the provincial government moves to curb or reduce other sources," he said.

In the commercial sector, diesel engines cough up the lion's share of NO_x. Heavy-duty diesel trucks, only 11 per cent of commercial vehicles in Alberta, give off 78 per cent of the NO_x emitted by all commercial vehicles.

Answer #3: (d) Saskatchewan is the main recipient of our sulphur emissions.

That's the way the wind blows. Once again, oil sands and heavy oil production cause major concern because acid-forming emissions from the Fort McMurray, Cold Lake, and Lloydminster areas most frequently waft over the most sensitive area of our eastern neighbour's environment — the Canadian Shield.

"Alberta's acid-forming emissions are not making a significant impact now," says Dr. Stanley R. Shewchuk, senior research scientist at the Saskatchewan Research Council in Saskatoon.

"However, if emissions continue to increase, we are going to have problems."

Emissons carried to Saskatchewan from Alberta amount to about 200,000 tonnes a year now, according to Shewchuk. "If that figure reaches 1 million tonnes, there will be severe degradation" to the environment of northern Saskatchewan.

He feels we have some leeway now while the oil industry is slow and we have time to study what the "emission increase scenario in the Fort McMurray area over the next three or four decades will be.

"Then we can put a maximum lid on emissions from Alberta to protect Saskatchewan's environment."

Answer #4: (a) Fewer than 10 small wind producers feed power into the Alberta electrical grid.

The exact number is seven. Five of them are connected to grids supplied by TransAlta Utilities, one is hooked up to the City of Calgary and another to the town of Cardston.

With power line installation costs running as high as $10,000 per kilometre, solar and wind generators are a popular alternative in remote locations. The Alberta Research Council estimates about 50 wind machines are used for purposes such as powering oil and gas batteries in areas far removed from electrical grids.

The Calgary grid installation belongs to Jason Edworthy, president of Nor'wester Energy Systems, the largest supplier of wind-powered electric generating systems in the province.

"Alberta has the best land-based wind resource in Canada," Edworthy says about our combination of favorable winds and populated areas.

"A 4 kw generator in a good wind resource area could supply an average home for a cost of $15,000 to $20,000 spread over about 25 to 35 years (the expected life of the system)," he said, adding that some users are able to recover their capital costs in as few as 12 years.

"Lenders are also showing an interest in wind plants now," probably because the ERCB's trial program has helped give greater credibility to wind generation and has allowed some additional return on a small producer's investment.

Eric Bailey is a freelance writer specializing in outdoor and interpretive writing, working from Alder Flats, Alberta.

How did you do?
Subtotal
(number of correct answers):

Are you a new reader?

Environment Views will be distributed free at all Environment Week activities throughout the province. If you picked this copy up at one of the locations, or are reading a friend's, welcome. Environment Views covers topics of environmental concern to Albertans, providing facts and a forum for a range of views. If you're interested in Alberta's environment, send in the card and become a subscriber. It's free. If the card is missing, phone or write to us at the address inside the front cover.

Scoring the Environment Challenge

There were 30 questions, for a possible total of 31 (Question #1 in waste management was worth 2 points if you got them all). Add up the subtotals for each of the sections. How did you do?

25-31
Congratulations, you have met the challenge.

15-24
A good showing. You're aware of the issues, but keep reading Environment Views.

0-14
Some of those trick questions have caught you. To be better prepared next time, make sure you're a subscriber.

If undelivered, return to:

Environment Views
Alberta Environment
9820 - 106 Street
Edmonton, Alberta T5K 2J6

Environment Week '86 June 1-7, 1986

"Living in our environment"

Environment Week, June 1-7 is a time to celebrate the wonders and beauty of our surroundings, and to promote awareness and appreciation of the Canadian environment.

Alberta now has a group — the Environment Week Association of Alberta — to coordinate many of the events and activities in celebration of Environment Week. E.W.A.A. is a non-profit society representing various Alberta groups who share an interest in promoting environmental awareness. Representation is from both the public and private sectors.

Here are some of the scheduled events and activities (a full calendar of events will be available):

What's on Where	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
"Picnic in the Park" Rundle Park, **Edmonton** 10:00 a.m. - 5:00 p.m. Displays, food, fun and entertainment	◄••••••►						
Celebrate "Clean Calgary" See the results of **Calgary's** annual Spring clean-up	◄••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••►
"Water Quality Monitoring Information" Police Point Interpretive Centre **Medicine Hat**	◄••••••►						
"Water Management Displays" Strathcona Science Centre, **Edmonton**	◄••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••►
View Alberta Environment's Mobile Air Monitoring Laboratory. Strathcona Science Centre, **Edmonton**	◄••••••►						
"Earth Day" Celebration Games, activities, displays, demonstrations Shannon Terrace Environmental Centre, Fish Creek Provincial Park, **Calgary** 10:00 a.m. - 5:00 p.m.	◄••••••►						
John Janzen Nature Centre, **Edmonton** Nature and environmental programs and activities	◄••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••►
Visit your local library to obtain information on environmental issues.	◄••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••►
Alberta Remote Sensing Center's display **Edmonton** Space Sciences Centre	◄••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••►
Biking in **Edmonton's** River Valley. A tour of the Capital City park system 10:00 a.m. - 1:00 p.m.	◄••••••►						
Alberta Environment Open House Oxbridge Place, 9820 - 106 Street, **Edmonton** 10:00 a.m. - 2:00 p.m.				◄••••••►			
Talk and field trip to a reclaimed site Waskasoo Park, **Red Deer.** evening							◄••••••►